WHAT IS CLAIMED IS:

1. A semiconductor device comprising:

a first hydrogen barrier film formed over a substrate;

a capacitive lower electrode formed on the first hydrogen barrier film;

a first insulating film formed on the first hydrogen barrier film to cover a side of the capacitive lower electrode and have the upper surface of the capacitive lower electrode exposed therefrom;

a capacitive insulating film made of an insulating metal oxide and formed across the boundary between the capacitive lower electrode and the first insulating film;

a capacitive upper electrode formed on the capacitive insulating film;

a second insulating film formed on the first insulating film to cover the capacitive insulating film and the capacitive upper electrode and having a sloped portion at a position corresponding to an edge of the capacitive upper electrode; and

a second hydrogen barrier film formed on the second insulating film.

2. A semiconductor device comprising:

a first hydrogen barrier film formed over a substrate;

a capacitive lower electrode formed on the first hydrogen barrier film;

a first insulating film formed on the first hydrogen barrier film to cover a side of the capacitive lower electrode and have the upper surface of the capacitive lower electrode exposed therefrom;

a capacitive insulating film made of an insulating metal oxide and formed across the boundary between the capacitive lower electrode and the first insulating film;

a capacitive upper electrode formed on the capacitive insulating film;

a second insulating film formed on the first insulating film to cover the capacitive

insulating film and the capacitive upper electrode;

a third insulating film made of a different material from that of the second insulating film, formed to cover the second insulating film, and rounded by reflowing in a portion corresponding to an edge of the capacitive upper electrode; and

a second hydrogen barrier film formed on the third insulating film.

3. The semiconductor device of claim 1 or 2, wherein a ferroelectric capacitor constituted by the capacitive lower electrode, the capacitive insulating film and the capacitive upper electrode is completely covered with the first and second hydrogen barrier films.

4. The semiconductor device of claim 3, wherein the first and second insulating films are formed into an island shape and the periphery of the first hydrogen barrier film is connected to the bottom of the second hydrogen barrier film so that the ferroelectric capacitor is completely covered with the first and second hydrogen barrier films.

5. The semiconductor device of claim 1 or 2, wherein the capacitive lower electrode is made of a multilayer film in which a TiN film, a TiAlN film, an Ir film, an IrO_2 film and a Pt film are stacked in this order.

6. The semiconductor device of claim 2, wherein the third insulating film is formed with an ozone CVD process and made of an undoped silicon oxide film or a silicon oxide film doped with at least one of boron or phosphorus.

7. A method for fabricating a semiconductor device, the method comprising the

steps of:

forming a first hydrogen barrier film over a substrate with a protective insulating film interposed therebetween;

forming a capacitive lower electrode on the first hydrogen barrier film;

forming a first insulating film on the first hydrogen barrier film so that the first insulating film covers a side of the capacitive lower electrode and the upper surface of the capacitive lower electrode is exposed;

forming a capacitive insulating film of an insulating metal oxide so that the capacitive insulating film covers the boundary between the capacitive lower electrode and the first insulating film;

forming a capacitive upper electrode on the capacitive insulating film;

forming a second insulating film on the first insulating film so that the second insulating film covers the capacitive insulating film and the capacitive upper electrode;

forming a sloped portion in the second insulating film at a position corresponding to an edge of the capacitive upper electrode; and

forming a second hydrogen barrier film on the second insulating film having the sloped portion.

8. The method of claim 7, wherein the step of forming the sloped portion comprises the step of performing sputtering on the second insulating film with inert ions to form the sloped portion.

9. The method of claim 7, wherein the step of forming the sloped portion comprises the step of etching the entire surface of the second insulating film to form the sloped portion.

10. The method of any one of claims 7 to 9, further comprising the step of selectively etching the second insulating film and the first insulating film to form the second insulating film and the first insulating film into an island shape, between the step of forming the sloped portion and the step of forming the second hydrogen barrier film,

wherein the step of forming the second hydrogen barrier film comprises the step of connecting the periphery of the first hydrogen barrier film and the bottom of the second hydrogen barrier film to each other so that a ferroelectric capacitor constituted by the capacitive lower electrode, the capacitive insulating film and the capacitive upper electrode is completely covered with the first and second hydrogen barrier films.

11. A method for fabricating a semiconductor device, the method comprising the steps of:

forming a first hydrogen barrier film over a substrate with a protective insulating film interposed therebetween;

forming a capacitive lower electrode on the first hydrogen barrier film;

forming a first insulating film on the first hydrogen barrier film so that the first insulating film covers a side of the capacitive lower electrode and the upper surface of the capacitive lower electrode is exposed;

forming a capacitive insulating film of an insulating metal oxide so that the capacitive insulating film covers the boundary between the capacitive lower electrode and the first insulating film;

forming a capacitive upper electrode on the capacitive insulating film;

forming a second insulating film on the first insulating film so that the second insulating film covers the capacitive insulating film and the capacitive upper electrode;

forming, on the second insulating film, a third insulating film made of a different material from that of the second insulating film;

performing a reflowing process on the third insulating film so that a portion of the third insulating film corresponding to an edge of the capacitive upper electrode is rounded; and

forming a second hydrogen barrier film on the third insulating film having the rounded portion corresponding to the edge of the capacitive upper electrode.

12. The method of claim 11, wherein the step of forming the third insulating film comprises the step of performing an ozone CVD process to form the third insulating film made of an undoped silicon oxide film or a silicon oxide film doped with at least one of boron and phosphorus.

13. The method of claim 11 or 12, further comprising the step of selectively etching the third insulating film, the second insulating film and the first insulating film to form the third insulating film, the second insulating film and the first insulating film into an island shape, between the step of performing the reflowing process on the third insulating film and the step of forming the second hydrogen barrier film,

wherein the step of forming the second hydrogen barrier film comprises the step of connecting the periphery of the first hydrogen barrier film and the bottom of the second hydrogen barrier film to each other so that a ferroelectric capacitor constituted by the capacitive lower electrode, the capacitive insulating film and the capacitive upper electrode is completely covered with the first and second hydrogen barrier films.

14. The method of claim 7 or 11, wherein the capacitive lower electrode is made of

a multilayer film in which a TiN, a TiAlN film, an Ir film, an IrO_2 film and a Pt film are stacked in this order.